OPTICAL FIBER AND OPTICAL AMPLIFIER

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- european: C03C13/04D2

Application number: JP20010047098 20010222

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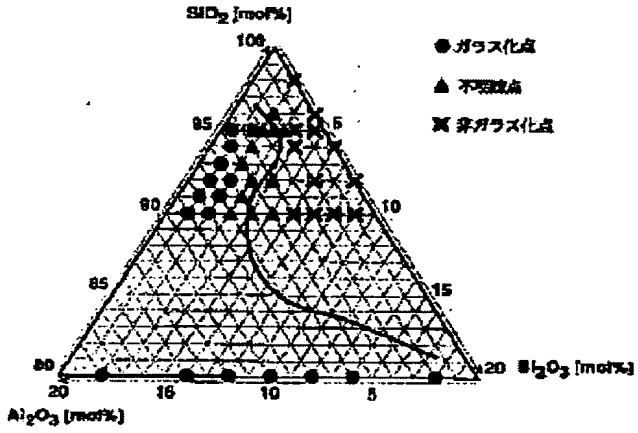
Abstract of **JP2002252397**

PROBLEM TO BE SOLVED: To provide a highly efficient optical fiber and optical amplifier which are suitable for the amplification of a 1.3-&mu m band. SOLUTION: In the optical amplifier, the optical fiber which is made of Bi-doped silica glass expressed by xBi2 O3 -yAl2 O3 -(1-x-y)SiO2 (x<y) and containing Bi2 O3 in the amount of 0.1-10.0 mol% and Al2 O3 in the amount of 2-20 mol% and conducts light amplification of the 1.3 &mu m band for semiconductor laser excitation of a 0.8 &mu m band is used.



JP 2002-252397 A
OPTICAL FIBER AND OPTICAL AMPLIFIER

[Claims]
[Claim 1] An optical fiber comprising a Bi-doped silica glass expressed by xBi_2O_3-yAl_2O_3-$(1-x-y)SiO_2$,

wherein the content of Bi_2O_3 and Al_2O_3 are in the range of 0.1 to 10.0 mol% and 2 to 20 mol%, and $x < y$.

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[Claim 3] An optical amplifier using an optical fiber,

wherein the optical amplifier performs the amplification of signal light in a 1.3 μm band, and

the optical fiber comprising a Bi-doped silica glass expressed by xBi_2O_3-yAl_2O_3-$(1-x-y)SiO_2$,

wherein the content of Bi_2O_3 and Al_2O_3 are in the range of 0.1 to 10.0 mol% and 2 to 20 mol%, and $x < y$.

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[0004] In this figure (Fig. 10), the numeral 101 represents an incident side, the numerals 102 and 105 represent an optical fiber, the numeral 103 represents optical input signals, the numeral 104 represents a semiconductor laser, the numeral 106 represents optical output signals, and the numeral 107 represents an emitting side. The optical input signals 103 are emitted from the emitting side 107 after being amplified by the semiconductor laser 104.
[0005] Figure 11 illustrates a schematic configuration representing a conventional optical amplifier.
[0006] In this figure, the numeral 111 represents an incident side, the numerals 112, 115 and 117 represent a conventional optical fiber, the numeral 113 represents optical input signals, the numeral 114 represents a semiconductor laser as an exciter, the numeral 116 represents an amplifier (rare earth element-doped fiber), the numeral 118 represents optical output signals, and the numeral 119 represents an emitting side. After transmitting the excitation light to the amplifier 116, which is derived from the semiconductor laser 114, the optical output signals 118 being amplified are emitted from the emitting side 119.

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[0033] (Example 2) The glass composition contains the following components, indicated by molar ratio: Bi_2O_3:Al_2O_3:SiO_2 = 3:7:90 (indicated by weight ratio: Bi_2O_3:Al_2O_3:SiO_2 = 18.6:9.5:72). Figure 6 illustrates the fluorescence property of the glass in response to the excitation light at 833 nm In Figure 6, the horizontal axis and the vertical axis indicate wavelength (nm) and intensity (relative units), respectively.

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[0035] (Example 3) The glass composition contains the following components, indicated by molar ratio: Bi_2O_3:Al_2O_3:SiO_2 = 1.5:3.5:95 (indicated by weight ratio: Bi_2O_3:Al_2O_3:SiO_2 = 10.3:5.3:84). Figure 8 illustrates the fluorescence property of the glass in response to the excitation light at 833 nm In Figure 8, the horizontal axis and the vertical axis indicate wavelength (nm) and intensity (relative units), respectively.

[0036] (Example 4) The glass composition contains the following components, indicated by molar ratio: Bi_2O_3:Al_2O_3:SiO_2 = 6:14:80 (indicated by weight ratio: Bi_2O_3:Al_2O_3:SiO_2 = 31:15.8:53). Figure 9 illustrates the fluorescence property of the glass in response to the excitation light at 833 nm In Figure 9, the horizontal axis and the vertical axis indicate wavelength (nm) and intensity (relative units), respectively.

Fig. 6

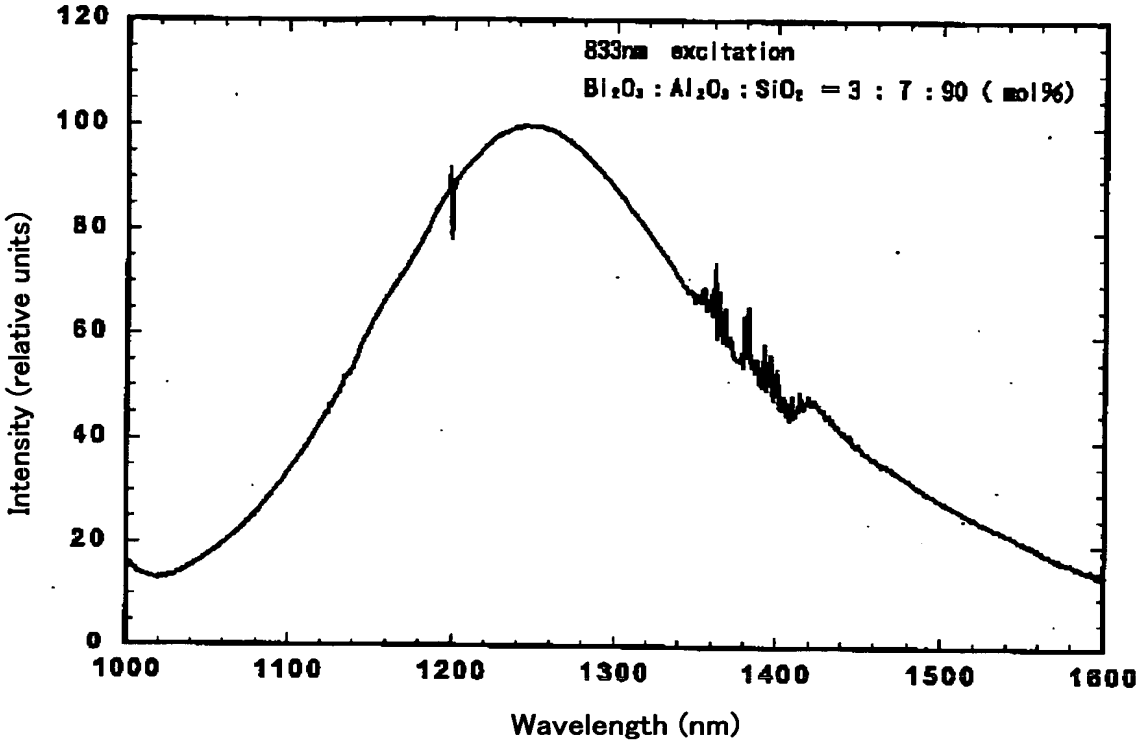

833nm excitation
Bi2O3 : Al2O3 : SiO2 = 3 : 7 : 90 (mol%)
Intensity (relative units)
0
20
40
60
80
100
120
1000
1100
1200
1300
1400
1500
1600
Wavelength (nm)

Fig. 8

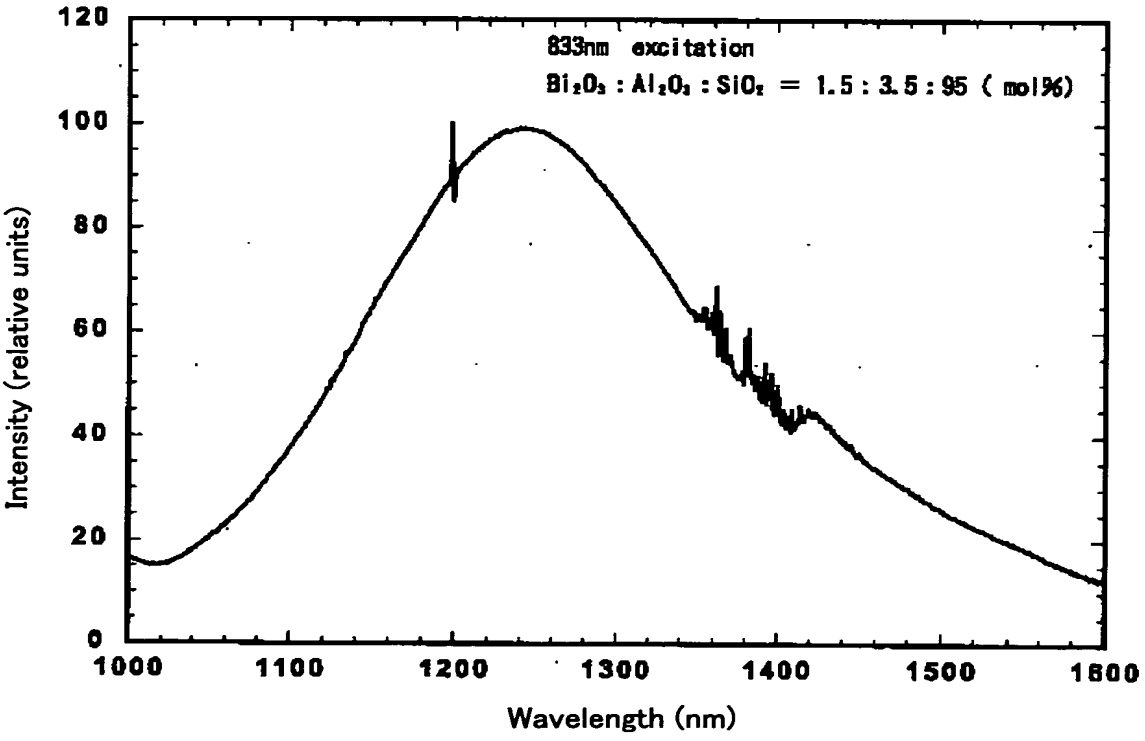

833nm excitation
Bi2O3 : Al2O3 : SiO2 = 1.5 : 3.5 : 95 (mol%)
Intensity (relative units)
0
20
40
60
80
100
120
1000
1100
1200
1300
1400
1500
1600
Wavelength (nm)

Fig. 9

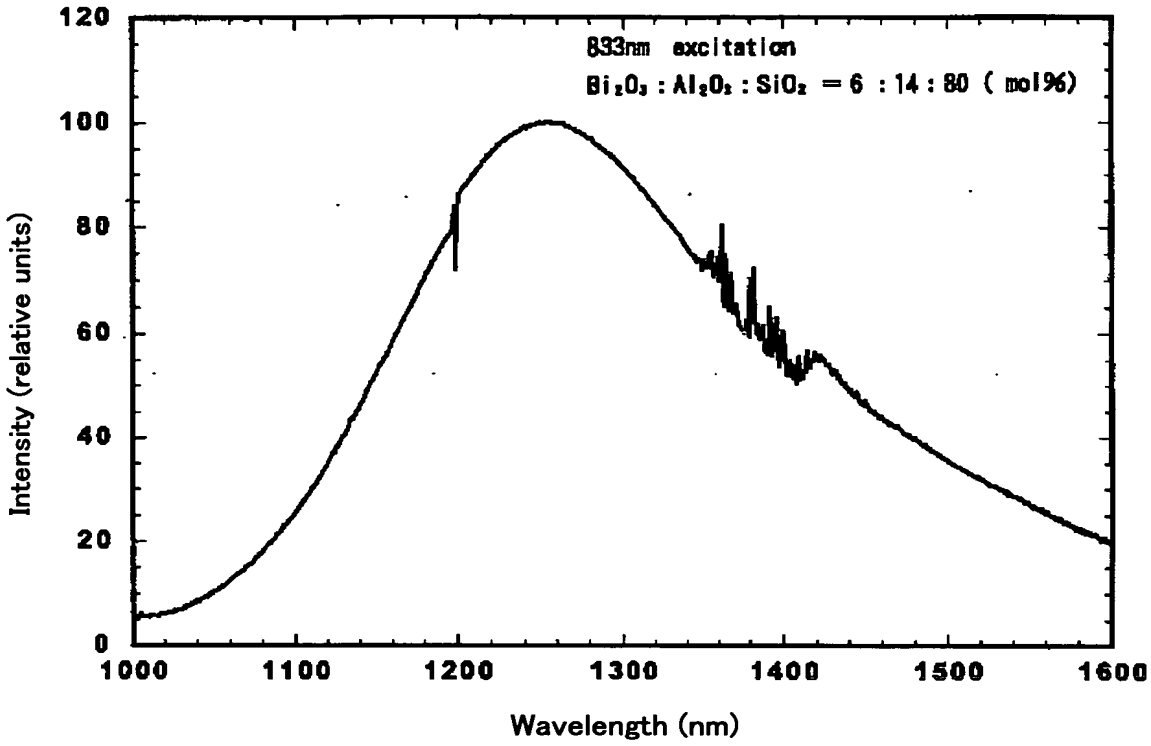
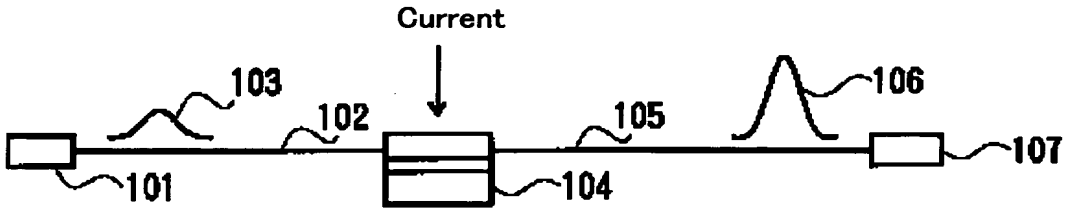
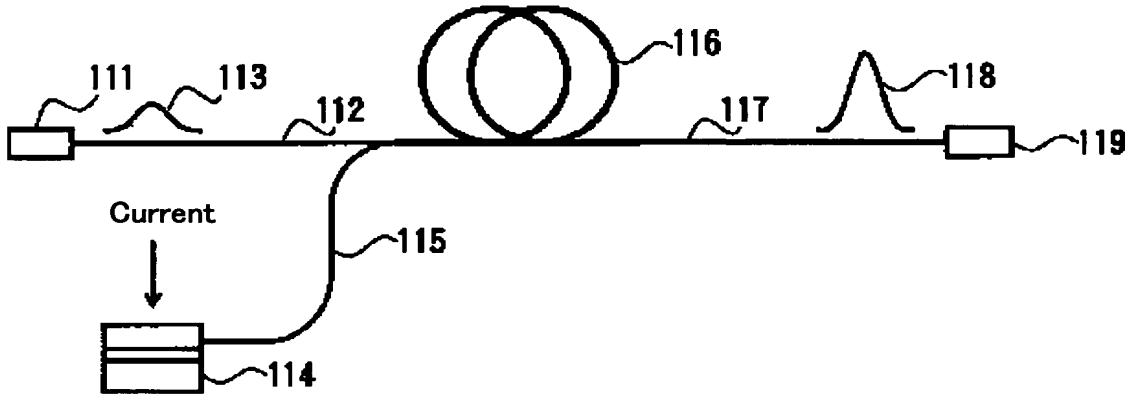


Fig. 10



101 incident side
102 optical fiber
103 optical input signals
104 semiconductor laser
105 optical fiber
106 optical output signals
107 emitting side

Fig. 11



111 incident side
112 conventional optical fiber
113 optical input signals
114 semiconductor laser as an exciter
115 conventional optical fiber
116 amplifier (rare earth element-doped fiber)
117 conventional optical fiber
118 optical output signals
119 emitting side